

Faculteit 'Bedrijf en Organisatie'

Bluetooth Low Energy wearables in een Internet of Things cloud-infrastructuur met behulp van een smartphone als gateway

Jan Van Braeckel

Scriptie voorgedragen tot het bekomen van de graad Bachelor in de toegepaste informatica

Promotor:
Joeri Van Herreweghe
Co-promotor:
Peter Leemans

Instelling: AllThingsTalk

Academiejaar: 2015-2016

Tweede examenperiode

Faculty 'Bedrijf en Organisatie'
Bluetooth Low Energy wearables in an Internet of Things cloud infrastructure using a smartphone as gateway
Jan Van Braeckel
Thesis submitted in fulfillment of the requirements for the degree of Bachelor in applied computer sciences

Affiliation: AllThingsTalk

Promoter:
Joeri Van Herreweghe
Co-promoter:
Peter Leemans

Academic year: 2015-2016

Second exam period



Preface

Contents

1	1.1 1.2	oduction Problem statement and research questions	5 5 5
2	Met	hodology	6
3	Blue	etooth Low Energy	7
	3.1	What is Bluetooth Low Energy	7
	3.2	Key differences between classic Bluetooth	7
		3.2.1 A new technology emerges	7
		3.2.2 Limitations of Bluetooth Low Energy	7
	3.3	Bluetooth configurations	7
	3.4	How low energy is achieved	7
4	The	Bluetooth Low Energy protocol stack	8
	4.1	Controller	8
		4.1.1 Physical Layer	8
		4.1.2 Link Layer	8
		4.1.3 Host Controller Interface	8
	4.2	Host	8
		4.2.1 Host Controller Interface	8
		4.2.2 Logical Link Control and Adaption Protocol	8
		4.2.3 Attribute Protocol	8
		4.2.4 Security Manager Protocol	8
		4.2.5 Generic Access Profile	8
		4.2.6 Generic Attribute Profile	8
	4.3	Application	8
		4.3.1 Application	8
5	Gen	eric Access Profile	9

CONTENTS CONTENTS

6	Gen	eric Attribute Profile	10			
	6.1	Profiles	10			
	6.2	Services	10			
	6.3	Characteristics	10			
	6.4	Descriptors	10			
7	Imp	lementing a basic server	11			
8	Android programming					
9	Con	clusion	13			

Introduction

- 1.1 Problem statement and research questions
- 1.2 AllThingsTalk

Chapter 2 Methodology

Bluetooth Low Energy

- 3.1 What is Bluetooth Low Energy
- 3.2 Key differences between classic Bluetooth
- 3.2.1 A new technology emerges
- 3.2.2 Limitations of Bluetooth Low Energy
- 3.3 Bluetooth configurations
- 3.4 How low energy is achieved

The Bluetooth Low Energy protocol stack

- 4.1 Controller
- 4.1.1 Physical Layer
- 4.1.2 Link Layer
- 4.1.3 Host Controller Interface
- **4.2** Host
- 4.2.1 Host Controller Interface
- 4.2.2 Logical Link Control and Adaption Protocol
- 4.2.3 Attribute Protocol
- 4.2.4 Security Manager Protocol
- 4.2.5 Generic Access Profile
- 4.2.6 Generic Attribute Profile
- 4.3 Application
- 4.3.1 Application

Chapter 5 Generic Access Profile

Generic Attribute Profile

- 6.1 Profiles
- 6.2 Services
- 6.3 Characteristics
- 6.4 Descriptors

Chapter 7 Implementing a basic server

Chapter 8 Android programming

Conclusion

Bibliography

List of Figures

List of Tables